

APPENDIX

(REDACTED)

COMMONWEALTH EDISON COMPANY
ILLINOIS COMMERCE COMMISSION DOCKET 00-0361
RESPONSES TO ILLINOIS INDUSTRIAL ENERGY CONSUMER'S
SECOND SET OF DATA REQUESTS

17. Please provide a copy of the 1996 Vance & Associates study referred to at Page 11, line 20 [testimony of Randall L. Speck, Edison Exhibit No. 4].

RESPONSE: A copy of this study is attached.

Cook County Cross Ex. 7

ComEd Ex. 5

**STATE OF ILLINOIS
ILLINOIS COMMERCE COMMISSION**

COMMONWEALTH EDISON COMPANY,

**Petition for Decommissioning
Expense Adjustment and for Permission to
File a Change to Rider 31**

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No. 97-_____

**DIRECT TESTIMONY OF JENE N. VANCE
PRESIDENT
VANCE & ASSOCIATES, INC.**

ILLINOIS COMMERCE COMMISSION

Petition for Decommissioning)
Expense Adjustment and for Permission to)
File a Change to Rider 31)

No. 97-_____

VANCE & ASSOCIATES, INC.

- member of the American Nuclear Society ("ANS"). Over the years I have chaired

or served on numerous nuclear industry boards and commissions, including the following: Chairman of the Atomic Industrial Forum ("AIF") Task Force on Public Risks and Costs in Low-Level Waste Disposal; Chairman of the ANS Committee on Liquid Radioactive Waste Standard for Boiling Water Reactors ("BWRs"); Chairman of the ANS Committee on Gaseous Radioactive Waste Standard for BWRs; Chairman of the AIF Task Force on Quantification of ALARA; Chairman of the AIF Committee on Low-Level Radiation -- Impact of Lowering Dose Limits; Vice-Chairman of the American Society of Mechanical Engineers Radioactive Waste System Committee; Member of the AIF Radiation Protection Subcommittee; Member of the Editorial Board of the publication Nuclear and Chemical Waste Management; Member of the ANS Committee on Packaging Solid Radioactive Waste for Transportation; Member of the Michigan Task Force on Low-Level Radioactive Waste Disposal; Member of the AIF Task Force on Low-Level Solid Waste Survey; Member of the AIF Task Force on Onsite Low-Level Reactor Waste Storage; and Member of the AIF Task Force on Migration of Radionuclides from Low-Level Waste Burial Grounds.

4. Q. Please describe your relevant job history before founding Vance & Associates.

A. I have dealt with radioactive waste management issues for over three decades. I first began dealing with these issues in 1963, when I began working for Dow Chemical Co. as a Radioactive Waste Engineer at the Rocky Flats Plutonium Purification Facility in Colorado. From 1966 to 1981 I worked for Bechtel

Corporation in a number of capacities, including the following: designing and putting in place liquid, solid, and gaseous radioactive waste systems at the Monticello nuclear power plant (1966-70); developing off-gas treatment systems for the Peach Bottom nuclear plant (1970-71); acting as Mechanical Group Supervisor at the Mendocino nuclear plant (1971-73); supervising Bechtel's radiation management group, which dealt with radioactive waste system design, shielding design, and as-low-as reasonably-achievable ("ALARA") radiation activities (1973-78); acting as assistant chief nuclear engineer at Bechtel's San Francisco power division (1978); and acting as chief nuclear engineer at Bechtel's Ann Arbor division (1978-81). From 1981 to 1984 I worked for Impell Corporation as a plant engineering division manager, where I supervised a 35-person division dealing with waste management consulting activities. I left Impell to found my own firm in 1984.

5. Q. What sort of work have you done at Vance & Associates?

A. A detailed list of projects at Vance & Associates is included on pages 2-6 of my resume, which is appended as Attachment A. Some of the most relevant for present purposes are as follows:

- o I have prepared a cost estimate of controlled disposal options for low-level waste for the Electric Power Research Institute ("EPRI");
- o I have prepared a cost estimate of low-level waste disposal costs for the Seabrook nuclear power plant;

- o I have prepared a cost estimate for low-level waste disposal, including estimates of possible savings from volume reduction, for GTS Duratek;
- o I have prepared a cost estimate for liquid waste treatment for the Grand Gulf nuclear plant;
- o I have prepared a cost estimate for low-level waste disposal costs for the New York Power Authority;
- o I have conducted waste management evaluations at Los Alamos National Laboratory, the U.S. Department of Energy Savannah River site, and the Grand Gulf nuclear station;
- o I have performed in-depth engineering evaluations of radioactive waste treatment systems at J.A. FitzPatrick, Susquehanna, and Grand Gulf;
- o I have analyzed liquid radioactive waste processing at twelve different nuclear stations;
- o I have conducted national studies of utilities' compliance with 10 CFR § 61 for the Electric Power Research Institute ("EPRI") and the Nuclear Energy Institute ("NEI");
- o I have developed and conducted three regional training courses for EPRI, and four utility-specific training courses, on compliance with 10 CFR § 61;
- o I have conducted reviews of waste characterization for ComEd;
- o I have developed several computer programs for radioactive waste management;

- o I have completed estimates of the amount of I-129 and Tc-99 for proposed low-level radioactive waste facilities in eight different states, including Illinois;
- o I have prepared studies of the waste expected to be generated in the decommissioning of several nuclear plants;
- o I have conducted several studies of BRC disposal, including a large study for EPRI, a study of the Envirocare facility in Utah; and a report for the NEI on alternative disposal of slightly contaminated waste materials;
- o I have undertaken dose assessment studies for EPRI, for the Nebraska low-level waste disposal facility, and for the Rancho Seco power plant;
- o I have conducted studies of waste vitrification for EPRI's Advanced Waste Management Initiative, for the Scientific Ecology Group, and for the Korean Advanced Institute of Science and Technology.

6. Q. Do you have any other relevant qualifications?

A. Yes. These are described on my resume, which is appended as Attachment A.

7. Q. What is the purpose of your testimony?

A. The purpose of my testimony is to provide a recommendation for a unit volume low level radioactive waste disposal charge (\$ per cubic foot) appropriate for use in the decommissioning cost estimates prepared by TLG Services, Inc. ("TLG").

8. Q. What do you mean by a unit volume charge?

A. By unit volume charge, I mean the basic unit volume prices charged by a low level radioactive waste disposal facility to the waste generator or disposer -- here, ComEd -- exclusive of any package surcharges resulting from total curies, weight, special handling requirements, etc. TLG derived these latter additional charges from information provided by the operator of the Barnwell facility.

9. Q. What was the unit volume price that you developed with ComEd support?

A. The unit volume price was \$364.

10. Q. How did you derive this figure?

A. I began with an economic model I developed to estimate the cost per cubic foot which would be charged by a typical low-level radioactive waste disposal facility in 1995 dollars, exclusive of pre-operational siting costs, state fees or benefits paid to the local community in exchange for siting a facility there. My economic model was derived directly from an Electric Power Research Institute ("EPRI") economic model for the construction and operation of a waste disposal facility. A fundamental assumption in my economic model is that the future disposal charge for ComEd decommissioning waste and waste from other customers will be based on full cost recovery, plus a fair rate of return for the funding sources required to develop, build and maintain the facility, plus an operating fee for the facility operator.

11. Q: What assumptions did you use with this model?

A: I assumed that a disposal facility sited in Illinois with a capacity of 3.5 million cubic feet would open in 2003 and receive ComEd waste through the year 2033. I then input ComEd's estimated waste volumes into the model, and utilized a 5.0 percent inflation rate. In my opinion, this 5.0 percent is a reasonable long-term estimate of inflation in low-level waste disposal costs.

12. Q: What was the result?

A: The model yielded a unit disposal charge in 1995 dollars of \$312 per cubic foot of waste, exclusive of pre-operational siting costs, state fees, and benefits paid to the local community.

13. Q: Is \$312 per cubic foot your final estimated disposal charge?

A: No, it is not. The economic model yielded an estimate in 1995 dollars. Moreover, the economic model does not incorporate certain annual expenses (such as state fees and a community charge) which would be incurred in conjunction with an Illinois facility. Therefore, it was necessary to make three changes to the preliminary result provided by the economic model. First, I escalated the 1995 dollar figure to 1996 dollars (again using the 5.0 percent inflation rate), which yielded an amount of \$328 per cubic foot. Second, I added in an Illinois Department of Nuclear Safety ("IDNS") annual fee, which, when spread over the expected volume at the facility, would amount to an additional \$12 per cubic foot.

Third, the model did not include the costs of benefits that will have to be provided to the community at which the facility is sited. In 1992 it was estimated that the facility operator would be required to pay \$2,150,000 per year in community benefits to Martinsville, the site then under consideration. This amount, escalated to 1996 dollars and spread over the facility's expected waste volume, would require an additional \$24 per cubic foot of waste. The addition of the \$12 per cubic foot IDNS fee and the \$24 per cubic foot community charge to the \$328 per cubic foot amount increased the overall cost to \$364 per cubic foot.

14. Q: Is \$364 per cubic foot your overall estimate of low-level radioactive waste disposal costs for ComEd's nuclear units?

A: Yes, it is.

15. Q: Are there any significant uncertainties in this estimate?

A: Yes. There are several uncertainties in making a projection of future unit volume disposal charges, which could cause future charges to be lower or higher than the value recommended to ComEd. The major issues in projecting the future cost of low level waste disposal are (1) the facility cost and economic models used to derive the disposal charge; (2) future escalation rates; (3) possible access charges or surcharges; and (4) the capacity of the disposal facility expected to receive the waste. While changes in any of these variables would alter my estimates, I believe that the costs and economic models that were used to derive the disposal charge

are sound and that they represent the most reasonable way to project future charges.

16. Q. Does this estimate include any access charges or other surcharges or penalties?
- A. No. For the present, I have assumed there would be no access charges levied on the ComEd wastes. This is consistent with my assumption that there will ultimately be an Illinois disposal facility, which would not charge extra for an Illinois utility. However, if no Illinois facility ultimately is built, it would be reasonable to assume a surcharge which would increase overall costs.
17. Q. Does this conclude your testimony?
- A. Yes.

Jene N. Vance
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505 336 4845

EMPLOYMENT

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Minnesota Mining & Metals Company (3M Co.)
CHEMICAL DESIGN ENGINEER

9/62-9/63
ST. PAUL, MN

Assigned to the coated abrasive research and development laboratory to develop new and/or improve coated abrasive products for the division.

Dow Chemical Company
RADWASTE DESIGN ENGINEER

9/63-5/66
ROCKY FLATS, CO

Assigned to the liquid radwaste facility at the Rocky Flat Plutonium Purification facility to develop processes to treat the plutonium-bearing aqueous waste streams.

Bechtel Power Corporation

5/66 - 1/81
SAN FRANCISCO, CA

MONTICELLO NUCLEAR PLANT (BWR)

5/66-9/70

Responsible for the design, procurement and ultimate start-up of the liquid, solid and gaseous radwaste systems, the condensate demineralizer, make-up treatment, fuel pool cooling and clean-up, closed cooling water and reactor water clean-up systems. This effort included system design, P&ID development, logic and control diagram development, equipment procurement specification preparation, bid evaluations, vendor drawing review and construction and start-up support.

PEACH BOTTOM NUCLEAR PLANT (BWR)

9/70 - 9/71

Assigned to project to develop the design of the advanced off-gas treatment systems for the two units. This effort included system design, equipment procurement, vendor drawing review, construction and start-up support.

MENDOCINO NUCLEAR PLANT (BWR)

9/71 - 1/73

Assigned Mechanical Group Supervisor on this twin-unit 1100 MWe BWR responsible for the design and procurement of all mechanical systems and equipment in the plant.

NUCLEAR STAFF ASSIGNMENT

2/73 - 2/78

Assigned to nuclear staff as supervisor of the radiation management group responsible for all radiation matters in the division. This included radwaste system design, shielding design, accident dose assessment and ALARA activities; developed company generic system designs for PWR and BWR liquid, solid and gaseous radwaste systems.

ASSISTANT CHIEF NUCLEAR ENGINEER
SAN FRANCISCO POWER DIVISION

2/78 - 9/78
SAN FRANCISCO, CA

CHIEF NUCLEAR ENGINEER
ANN ARBOR DIVISION

9/78 - 1/81
ANN ARBOR, MI

Responsible for the adequacy and review of nuclear safety and design projects for nuclear power plants. Responsible for the management of 85 engineers in the Nuclear Engineering Department staff assigned to nuclear design projects.

Impell Corporation

PLANT ENGINEERING DIVISION MANAGER

1/81-8/84

ATLANTA, GA

Responsible for division profit and loss for a 35 person division. Responsible for strategic planning, marketing development, long-range planning and project management.

Responsible for managing backfit design activities and waste management consulting activities in the division.

Vance & Associates, Inc.

PRESIDENT

8/84 - Present

RUIDOSO, NM

Responsible for the management of the corporation including; profit and loss, business development, operations, financial analysis and marketing, technical marketing, project management, and project execution.

WASTE MANAGEMENT EVALUATION

Completed an evaluation of Waste Management Program at Los Alamos National Laboratory to review waste management practices to improve productivity, achieve cost reduction and to establish the future state for waste management site-wide.

Participated in the Peer Review Team for NUS at the Savannah River Site of the environmental Impact statement on waste management.

Performed an evaluation of the low level liquid waste processing system at Los Alamos National Laboratory and reviewed proposed UF/RO system.

Completed an investigation of the sources of inleakage into the radwaste systems at Grand Gulf nuclear station.

RADWASTE SYSTEM ENGINEERING EVALUATIONS

Performed in-depth engineering evaluations of the total radwaste treatment systems at J.A. FitzPatrick and Susquehanna. The studies resulted in recommended modifications to operations and to system hardware and components.

Performed technical and economical viability assessment of the Grand Gulf nuclear station existing vendor system.

Completed a second radwaste evaluation after the shutdown of the JA FitzPatrick evaporators to compare the treatment of liquid waste water by ion exchange versus evaporation to determine if the evaporator should be re-started.

LIQUID RADWASTE PROCESSING

Conducted filtration and waste processing equipment studies at the following nuclear plants:

<i>Braidwood</i>	<i>LaSalle</i>
<i>Byron</i>	<i>Shearon Harris</i>
<i>Dresden</i>	<i>Quad-Cities</i>
<i>Indian Point-2</i>	<i>Monticello</i>

Completed precoat filtration optimization studies at

Monticello
Susquehanna
Grand Gulf
Browns Ferry

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These studies determined the precoat and body feed materials to be used, the polyelectrolyte to be used, and the optimum body feed and polymer dosages based on influent turbidity, that would achieve maximum throughput capacities.

Completed liquid radwaste processing studies on:

- TOC removal techniques for equipment and floor drains at Grand Gulf.
- The use of polyelectrolytes as a pretreatment for the processing of liquid radwaste to remove colloidal radionuclide species on organic ion exchange media at Indian Point-2.
- Examined impact and removal efficiency of GTS Duratek organic ion exchange media at Indian Point-2.
- Treatment methods at Indian Point-2 to improve the removal efficiency of radioactive antimony from liquid radwaste.
- Completed examination of methods to improve the removal efficiency of radioactive antimony from low level generated waste at ComEd - Byron and Braidwood stations.
- The use of selective ion exchange processing by inorganic ion exchange material for the removal of cesium at Grand Gulf.
- Developed a filtration technique using diatomaceous earth and organic coagulant aids to enhance the filterability of the reactor water at TMI-2 to improve water clarity to allow defueling work to continue.
- Completed antimony removal studies at Byron and Braidwood.

REACTOR WATER CHEMISTRY

Completed a study on the sources and causes of high reactor water chromate levels at LaSalle.

Developed a precoating technique to improve the run lengths and silica removal capacity of the reactor water clean-up filter/demineralizers at Grand Gulf.

Investigated the sources and causes of high sulfate ion concentrations in reactor water at Grand Gulf. Developed reactor water input model for sulfates during steady-state power conditions and transients at Grand Gulf.

CONDENSATE POLISHERS

Completed an investigation for EPRI on the effect of body feeding condensate filter/demineralizers to achieve longer run lengths and reduce solid waste volume generation at Monticello, Plant Hatch and WNP-2.

Completed the examination of polisher and URC operating techniques at Grand Gulf to determine methods for eliminating the conductivity spikes in reactor water caused by placing beds in service.

Completed laboratory-scale testing to optimize performance of powdered ion exchange resin for condensate/polishing systems at BWRs.

10CFR61 STUDIES

Completed an industry-wide evaluation of utility's 10CFR61 compliance programs for UNWVG at NEI.

Performed an assessment of the impact of the 10CFR61 regulations on the nuclear industry for EPRI.

Completed a study for EPRI on evaluating the technical basis for concentration averaging of 10CFR61 radionuclides in low level waste for classification purposes.

Developed the industry response for the Nuclear Energy Institute to the NRC's position on radionuclide averaging in waste characterization.

Developed industry-wide scaling factors for DAW and the bases for establishing their use industry-wide.

Performed as co-investigator on an EPRI study to analyze the industry scaling factor data from nearly 3,000 10CFR61 samples.

Also performed as co-investigator on a study to review 10CFR61 waste characterization methods for EPRI.

Conducted three (3) U.S. regional training courses for EPRI on 10CFR61 Waste Characterization.

Completed a study to evaluate preferred waste form for wet process wastes for extended onsite interim storage for ComEd.

Completed a study on waste characterization of activated hardware for ComEd - Dresden station.

Conducted training courses on 10CFR61 Waste Characterization programs for: *Comanche Peak, Alabama Power Co., Carolina Power & Light and ComEd stations.*

Completed review of the ComEd system-wide waste characterization programs to improve the overall accuracy of the radionuclide concentration estimates.

Provided consulting to ENEL (Italy) to train on use of V&A computer codes 3R-STAT for I-129 and Tc-99 inventory and SF-STAT for the ENEL waste characterization program.

COMPUTER CODE DEVELOPMENT

Developed and delivered to ten utilities, ISOSCALE an isotope behavior analysis computer program for determining scaling factors for the 10CFR61 isotopes.

Completed the development of RADSOURCE, a scaling factor derivation computer code for EPRI. This code represents refinement and advancement to the ISOSCALE code.

Completed the development of 3R-STAT, a computer code that assesses the reactor core conditions from data on the short-lived iodine isotopes to predict the release rates of I-129 and Tc-99 from the fuel in an operating reactor.

Completed the preparation of the Topical Report on 3R-STAT which was submitted to the NRC for approval. This included the preparation of responses to the NRC request for information to support the review of the Topical Report.

Completed the development of SF-STAT, a scaling factor computer code for use in the nuclear industry's waste characterization programs.

Currently working on the development of a computer code (CORE-STAT) that predicts the number of pin failures in a reactor core, based on reactor coolant isotopic data.

I-129 AND Tc-99 SOURCE TERM STUDIES

Have completed studies that project the inventories of I-129 and Tc-99 that could be in nuclear plant waste shipped to LLW Disposal Facilities for the host states of:

*New York
Illinois
Nebraska
Vermont
Pennsylvania*

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North Carolina
Connecticut
Texas

This total effort included the analysis of 181 complete fuel cycles from 54 reactors in the U.S.

EXPERT SYSTEMS

Performed as the principal investigator on an EPRI project in the development of a functional specification for a radwaste expert system in the application of artificial intelligence techniques to radwaste.

Completed the first phase of an EPRI study to develop and assess the adequacy of existing industry data for use in the required databases in an expert system on liquid waste processing.

Performed as principal investigator on the development of the system specifications for an ALARA expert system for NYPA.

DECOMMISSIONING STUDIES

Completed a study to develop the disposal volumes and activity content for the waste generated during the decommissioning of Vermont Yankee.

Completed a study for EG&G to estimate the volume of waste generated by the nuclear industry in decontamination and decommissioning activities that would be greater than Class C.

Performed as co-investigator on a study for ComEd to estimate the disposal waste volumes that could result from the decommissioning of a 1100 MWe PWR and BWR.

Performed as co-investigator on an EPRI study to refine the ComEd decommissioning study and to account for the application of free release and BRC disposal of some of the plant materials.

BRC STUDIES

Performed as the technical coordinator on the \$2.3M EPRI BRC research program to develop a petition for a BRC rule making to allow BRC disposal of specific nuclear plant wastes. In this same program, completed stand-alone studies in support of the program on:

- *the extent and nature of the "hot" particle problem in radwaste.*
- *selecting plants for inclusion in a sampling program on the basis of fuel performance.*
- *the variability of the radionuclides and activity concentration in DAW.*

Completed an EPRI study to investigate the suitability of a clean waste verification method using a bag monitor.

Completed a study for Quadrex to determine radionuclide concentration limits and the dose impacts for BRC waste disposal at the Envirocare site in Utah.

Completed the analysis and a Topical Report for the Nuclear Energy Institute for submittal to the NRC to seek approval for the alternative disposal of slightly contaminated waste materials.

DOSE ASSESSMENT STUDIES

Completed an investigation into the environmental transport and dose impacts in gaseous and groundwater pathways from the disposal of C-14 in LLW Disposal facilities for EPRI. Reviewed available computer codes for groundwater modeling, and performed a intercomparison code results.

Completed an assessment of the C-14 production rates in LWRs and estimated quantities of C-14 in solid low-level waste.

Acted as a consultant on the groundwater models and parameters used for the Nebraska LLW disposal facility.

Completed an evaluation of the technical bases for the 10CFR61 waste form stability requirement for EPRI. This included a review of the intruder and ground water models by the NRC.

Completed a review of the environmental monitoring program at Rancho Seco and developed an environmental model of Cs-137 behavior in liquid releases to justify lower Cs-137 bioaccumulation factors in fish.

DISPOSAL COST ANALYSES

Completed an evaluation for EPRI for the technical and economic evaluation of controlled disposal options for low level radioactive waste.

Completed an evaluation for North Atlantic Energy Service Corporation to develop the decommissioning disposal charge models for use in the Seabrook decommissioning estimate based on the full-cost recovery approach. Provided testimony to the NDFC for the bases of the V&V recommended disposal charge for Seabrook.

Completed an evaluation on the base case unit volume disposal charge and its relationship to the cost for market waste treatment technologies in volume reduction for GTS Duratek.

Completed an evaluation for ComEd for the Illinois unit disposal cost for future disposal facilities.

Completed a study on the cost assessments of liquid waste treatment options at Grand Gulf nuclear station.

Performed evaluation of future unit disposal charges for NYPA.

WASTE VITRIFICATION

Acted as technical coordinator for the EPRI Advanced Waste Management Initiative (AWMI) aimed at the vitrification of all organic-based low level waste.

Performed evaluation for Scientific Ecology Group on the viability assessment of vitrification for low level wet process waste for the nuclear power industry. The study included VR factors for vitrification and the estimates for future disposal costs.

Provided consulting services to Korean Advanced Institute of Science and Technology (KAIST) on the economical and technical feasibility for vitrification of LLW from Korean nuclear plants.

MISCELLANEOUS

Completed a study to develop estimates of the future generation volumes of "greater than Class C" ion exchange resins and filters from the nuclear industry for EG&G.

Performed as lead on the EPRI utility/consultant review committee to review the liquid radwaste treatment systems for PWRs and BWRs for the Advanced Light Water Reactors project.

Provided reactor coolant analyses for scaling factor shifts at Carolina Power & Light nuclear stations.

EDUCATION

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<i>Major:</i>	B.S., Chemical Engineering NEW MEXICO STATE UNIVERSITY CHEMICAL ENGINEERING	Graduated 196 LAS CRUCES, N
	Registered Professional Engineer STATE OF CALIFORNIA , ENGINEERING BOARD NUCLEAR ENGINEERING LICENSE	LICENSED 197
	Registered Professional Engineer STATE OF CALIFORNIA , ENGINEERING BOARD MECHANICAL ENGINEERING LICENSE	LICENSED 197

PROFESSIONAL AFFILIATIONS

- American Nuclear Society
- Chairman, AIF Task Force on the Public risks and Costs in the Low-Level Waste Disposal Cycle
- Chairman, ANS 55.3 Liquid Radwaste Standard for BWRs
- Chairman, ANS 55.5 Gaseous Radwaste Standard for BWRs
- Chairman, AIF Task Force on Quantification of ALARA
- Chairman, AIF Ad-Hoc Committee on Low-Level Radiation - Impact of Lowering Dos Limits
- Vice-Chairman, ASME-NED Radwaste System Committee (elect)
- Member, AIF Radiation Protection Subcommittee
- Member, ANS 6.9/58.13 Standard for Post-Accident Radiation Protection Design Criteria
- Member, Editorial Board of Nuclear and Chemical Waste Management
- Member, AIF Task Force on Engineering Techniques for reducing Radiation Exposure in Operating Plants
- Member, AIF Task Force on Impact on the Nuclear Industry of Reduced Exposure Limits
- Member, ANSI 14.9.2 Packaging Solid Radwaste for Transportation
- Member, Michigan Professional Engineering Society Task Force to develop position paper for the State of Michigan on low-level waste disposal

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- Member, AIF Task Force on Occupational Exposure Data Base
- Member, EPRI Advisory Committee on Iodine Data Collection
- Member, AIF Task Force on Low-Level Solid Waste Survey
- Member, NRC Advisory Panel on Waste Classification Data Base
- Member, AIF Task Force on Onsite Storage Alternative for Low-Level Reactor Waste
- Member, AIF Task Force on Migration of Radionuclides from Low-Level Waste Burial Grounds